

Competitiveness of Indonesian Livestock Production among ASEAN Countries

(Daya Saing Produksi Ternak Indonesia di Antara Negara-Negara ASEAN)

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ABSTRACT

ASEAN is one of the fastest growing regional economic communities and its combined human population of around 600 million people. Heterogeneity of ASEAN member countries includes population size, cultural background, structure and development of the economy, and level of income. Agriculture is well known as one of the key engine of economic growth of the ASEAN member countries, seen from the fact that most of the countries in this region are strongly depend on this sector including animal production. The purpose of this paper is to discuss the competitiveness of Indonesian production costs of selected livestock products compared to other ASEAN member countries. The following member countries are at their first rank or competitiveness status for the livestock and poultry commodities, namely Cambodia for beef cattle, Malaysia for pigs, the Philippines for sheep and goats, and Thailand for broiler chickens. Indonesia with the highest poultry population in the region, compared to Thailand, Malaysia, and the Philippines has not yet performed as that good in terms of production costs. The position of Indonesia based on production cost was at the fourth rank for beef, third for sheep and goat, and fourth for broiler compared to other ASEAN member countries. Therefore, Indonesia should improve the efficiency production of livestock and poultry to achieve better competition status.

Key words: ASEAN, livestock, production, competitiveness

ABSTRAK

ASEAN adalah salah satu komunitas masyarakat ekonomi regional dengan pertumbuhan ekonomi tercepat dan jumlah penduduk sekitar 600 juta orang. Heterogenitas negara anggota ASEAN meliputi jumlah populasi, latar belakang budaya, struktur dan perkembangan ekonomi, serta tingkat pendapatan. Pertanian dikenal sebagai indikator utama pertumbuhan ekonomi negara-negara anggota ASEAN, karena sangat bergantung pada sektor pertanian termasuk peternakan. Tujuan penulisan makalah ini adalah untuk membahas daya saing biaya produksi Indonesia untuk produk ternak dibandingkan dengan negara anggota ASEAN lainnya. Negara peringkat pertama status daya saing untuk komoditas peternakan, yaitu Kamboja untuk sapi potong, Malaysia untuk babi, Filipina untuk domba dan kambing, serta Thailand untuk ayam broiler. Indonesia dengan populasi unggas tertinggi di wilayah ini, masih menerapkan biaya produksi yang lebih tinggi dibandingkan dengan Thailand, Malaysia, dan Filipina. Posisi Indonesia berdasarkan biaya produksi berada pada peringkat keempat untuk daging sapi, ketiga untuk domba dan kambing, serta keempat untuk ayam pedaging dibandingkan dengan negara anggota ASEAN lainnya. Karena itu, Indonesia harus meningkatkan efisiensi produksi ternak untuk mencapai status persaingan yang lebih baik.

Kata kunci: ASEAN, peternakan, produksi, daya saing

INTRODUCTION

Southeast Asian region is one of the fastest growing regional economic communities, which according to ASEAN statistic 2014 has population of more than 625 million people and relatively high employment share of agriculture sector (ASEAN 2014). In addition to that ASEAN member countries are diverse in many aspects includes population sizes, cultural backgrounds, structure, and development of the economies. Indonesia being the highest human

population country in the region, with more than 250 million peoples, has about 52% of the people live in urban areas. This country also has 35% employment share in agricultural sector as opposed to Brunei, the least populated country in the region, with 500 thousand people and only 1,000 people were working in agricultural sector. Furthermore, Singapore as an island country with 4,5 million human population, almost entire population live in urban area, with only 2,000 of people working in agriculture sector.

It is understandable that a country with a growing middle and high income household pushes the demand for high income elastic commodity such as livestock products. This includes particularly meat, which after all will stimulate the red and white meat industries to grow fast. Indonesia, being the largest country in the region in terms of human population, and with about 52% of urban population, is likely to have high potential demand for high protein food including livestock products. This situation creates an increasing pressure on the livestock subsector to meet the growing demand for a high-value animal protein (Matsumura 2011). Consequently, livestock subsector will grow in line with a combination of human population growth, rising incomes, and urbanization, since there is a strong positive relationship between increasing of income of a household and growing consumption of animal protein (European Union 2015).

In general, these particular households which categorized as middle and upper income household, have higher demand for meat, milk, and eggs along the tendency to reduce the expenditure on carbohydrate source foods. OECD-FAO (2015) further found that the major changes in the demand were observed in developing countries, where continued but slowing population growth, rising per capita incomes and urbanization all increase the demand for food. Rising incomes prompt consumers to diversify diets by increasing the consumption of animal protein relative to starches. For this reason, the prices of meat and dairy products are expected to be high relative to the prices of crops, while among crops, the prices of coarse grains, and oilseeds used for feed should rise relative to the prices of food staples.

Agriculture is well known as one of the key engine of economic growth of the ASEAN countries, seen from the fact that most of the countries in this region are strongly depend on this sector. In addition to that, due to the fact that Southeast Asia has a dynamic geographical characteristics of its tradition, ASEAN region has a variety of food and agriculture tradition, which makes a number of ASEAN member countries ranked as worldwide top exporters in agricultural products such as rice, fruits, vegetables, and coffee. ASEAN also has a role as a global leader in industrial crops like palm oil, rubber, and pepper, which therefore has strong trade links for these industrial products with other countries across the globe, particularly with countries who have established trade relationship with many ASEAN member states. This fact proofs that the development of the agriculture sector in the region will remain one of the most important area for economic growth under ASEAN cooperation (CEIC Data 2016).

According ASEAN (2008), significant progress has been made in the advancement of ASEAN's regional economic integration. The removal of formal

restrictions in different areas, along with other facilitating domestic, and external factors, has contributed to growing trade and investment in the region. Intra-ASEAN tariffs have gone down significantly, and are now close to negligible in the case of Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand (ASEAN6), although the real impact to business will depend on the degree of preference utilization. While growing relatively faster than the overall ASEAN trade, the performance of intra-ASEAN trade has been uneven across the priority integration sector. In particular, the growth in intra-ASEAN exports in 2007-2013 has been slower than that in extra-ASEAN exports in all but three priority integration sectors, the exceptions were fisheries, automotive, and electronic products.

There are five core elements of its single market and production base according to the (ASEAN 2008). They include free flow of goods, free flow of services, free flow of investment, free flow of capital, and free flow of skilled labor. In addition to that, systems of standards, quality assurance, accreditation, and measurement are crucial to promote greater efficiency and enhance cost effectiveness of production of intra-regional imports and exports. Therefore, purpose of this paper is to discuss and compare the production costs of selected livestock products in each ASEAN member country to describe how competitiveness its products. In addition, using the producer prices information as a proxy for comparison between countries, it will identify which member country has the most cost effectiveness to produce red and white meats from selected livestock species, such as beef, sheep and goats, broiler, and pigs.

INDICATOR OF COMPETITIVENESS FOR SELECTED LIVESTOCK COMMODITIES

There are 10 member countries of ASEAN, namely Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam that could be used for some data analysis. Their important indices such as population, agricultural land, gross domestic product share of agriculture were taken from ASEAN (2014). Data from FAOSTAT (2014) were used for identifying livestock population and production, as well as producer's price for selected meat producing species such as beef cattle, sheep and goats, broiler and pigs. However, some information of member countries are unavailable. Producer's price data related to each country were used as a proxy for cost of production. This indicator was then used to compare the competitiveness livestock production among ASEAN member countries. Previously, using different indicators, Tangendjaja (2010) studied the competitiveness of Indonesia compared to other

ASEAN countries in poultry production based on the data of 2004-2008.

The producer's price is defined as the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any or similar deductible tax, invoiced to the purchaser (OECD 2005). It excludes any transport charges invoiced separately by the producer. It also excludes supplier's retail and wholesale margins and separately invoiced transport and insurance charges. A producer price is also considered as the average price or unit value received by farmers in the domestic market for a specific agricultural commodity produced within a specified 12-month period (FAOSTAT 2014). This price is measured at the farm gate, that is at the point where the commodity leaves the farm, and therefore does not incorporate the costs of transport and processing. Typically producer prices are seen as prices of input goods, which are used to produce final goods. Therefore, the producer price may be used as a proxy to the production cost of commodities being observed (Ready et al 2015). The producer price data series presented for selected livestock producing meat such as beef cattle, sheep and goats, broiler and pigs, presented in FAOSTAT were used as a basis for comparison. Since the data are expressed in the same currency unit (USD/ton), it helps in obtaining consistent data series from different member countries. In order to simplify the numbers for comparison, this study converted USD/ton as the unit of measurement of producer's price to USD/kg. Finally, countries are then ranked based on their competitiveness in terms of production costs for producing meat from beef cattle, sheep and goats, broiler and pigs.

Domestic resources cost (DRC) approach has been widely used to measure products competitiveness as a comparative advantage, however due to specific needs of policy analysis and its goal, therefore concepts and size of its competitiveness could be varied across geographically, products, and time dimension (Ambastha & Momaya 2004; Bojnec & Fertő 2012). Domestic inputs cost, revenue, and tradable input costs were factors that affected into DRC, where $0 < \text{DRC} < 1$ indicated its products in a comparative competitiveness commodity (Monke & Pearson 1989; Masters & Winter-Nelson 1995). The DRC has been defined as the shadow value of non tradable factor inputs used in an activity per unit of tradable value added. Daryanto (2007; 2009; 2010) had reported this DRC approach to measure livestock competitiveness in Indonesia for beef cattle and poultry production.

RESOURCES FOR COMPETITIVENESS AND COMPARATIVE ADVANTAGES DETERMINATION

In general, human population growth in the region was considered high (1.3%). Indonesia is a country with the largest population (250 million), among ASEAN member countries followed by the Philippines (almost 100 million), Vietnam (90 million), Thailand (68 million), and Myanmar (62 million). Other ASEAN countries have lower population, ranging from Brunei (0.5 million) to Malaysia (30 million). The highest population growth of 2.0% was observed in Lao PDR with population around 7 million. Among five countries with high human population, the Philippines has the highest population growth rate (1.8%) compared to the average population growth of the region 1.3%, and Thailand shows the least population growth of only 0.5% in the region (Table 1).

Livestock products are considered as high income elastic commodity; therefore, it is interesting to observe the proportion of urban population and GDP per capita in each member country. Urban population represents middle and upper income households, which are spending more of their incomes for livestock and horticulture products compared to carbohydrate source foods. Table 2 indicates that in 2013, potential consumers of livestock products are estimated to be high in Singapore with 100% of the population stay in the urban area, followed by Malaysia (73%), Indonesia (52%), while other member countries have less than 50% of their urban population.

The population distribution can also be used to estimate potential livestock producers. Portions of population who are staying in rural areas have their predominant source of income from the agriculture sector including livestock subsector. This agricultural population becomes a good indicator as potential agricultural including livestock producer. For example, Indonesia, Vietnam, Myanmar, Thailand, and the Philippines are among member countries with higher portion of people working in agricultural sector, which is indicated by respective agricultural population. Agricultural population of the region also varies from only 1,000 people in Brunei to 2,000 people in Singapore as opposed to almost 50 million people in Indonesia. Table 3 further explains that agricultural population seems to be closely related to total population and total agricultural land in each country. Indonesia has the largest agricultural land of 56.5 million ha within the region compared to other ASEAN

Table 1. Population of ASEAN member countries, 2006-2013 (000 people)

Country	2006	2007	2008	2009	2010	2011	2012	2013	(%)
Brunei	365	370	375	380	387	393	400	406	1.6
Cambodia	14,081	14,364	13,396	14,085	14,303	14,521	14,741	14,963	1.5
Indonesia	222,747	225,642	228,523	231,370	237,641	241,991	245,425	248,818	1.4
Lao PDR	5,747	5,873	6,000	6,128	6,256	6,385	6,514	6,644	2.0
Malaysia	26,550	27,058	27,568	28,082	28,589	29,062	29,518	29,948	1.5
Myanmar	56,515	57,504	58,377	59,130	59,780	60,384	60,976	61,568	1.2
Philippines	86,973	88,575	90,457	92,227	94,013	95,804	97,594	99,385	1.8
Singapore	4,401	4,589	4,839	4,988	5,077	5,184	5,312	5,399	1.6
Thailand	65,574	66,041	66,482	66,903	67,313	67,597	67,911	68,251	0.5
Vietnam	83,311	84,218	85,118	86,024	86,932	87,840	88,773	89,709	1.1
ASEAN	566,263	574,233	581,136	589,317	600,291	609,161	617,165	625,091	1.3

Source: ASEAN (2014)

Table 2. Urban population of ASEAN member countries, 1990-2013 (%)

Country	1990	2006	2007	2008	2010	2011	2012	2013
Brunei	n.a.	73.6	74.4	n.a.	75.7	78.5	78.7	n.a.
Cambodia	12.6	20.0	17.8	17.9	19.9	21.0	21.5	21.4
Indonesia	30.6	43.1	43.1	n.a.	49.8	51.2	51.9	52.0
Lao PDR	18.1	21.0	29.7	29.7	33.2	35.0	35.3	36.0
Malaysia	50.7	n.a.	63.4	63.5	71.0	71.9	72.7	73.0
Myanmar	24.2	30.5	30.5	30.6	30.7	30.8	30.8	30.8
Philippines	48.8	63.0	63.5	64.2	66.4	48.5	48.6	n.a.
Singapore	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Thailand	18.7	30.0	32.9	33.8	33.3	36.1	33.9	n.a.
Vietnam	19.7	27.7	28.2	29.0	30.5	31.6	31.9	32.3
ASEAN	30.1	44.1	44.3	n.a.	43.6	44.2	44.7	n.a.

n.a.: not available

Source: ASEAN (2014)

member countries. Following Indonesia are Thailand with 21.9 million ha, Myanmar 12.6 million ha, the Philippines 12.4 million ha. However, proportionally Thailand has 43% of its total land area used for agricultural purposes, followed by the Philippines 41.6%, Vietnam 35%, Cambodia 33%, and Indonesia 31%.

Furthermore, Table 4 presented some indices such as GDP share, employment share, export and import share. In terms of GDP share of agricultural sector it is obvious that in 2012 Myanmar has the largest share of 35% followed by Lao PDR 27%, Cambodia 25%, and Vietnam 16%. Table 4 also presents the GDP share of Agriculture in the region which varies from 1% for Brunei to 35% for Myanmar. Indonesia and the Philippines have relatively high employment share of agricultural sector which were

around 35%. Meanwhile, Myanmar, Lao PDR, Thailand, Vietnam and Indonesia are member countries with higher import share of agricultural sector compared to the rest of countries. It is also obvious that in 2013 the export shares of agricultural sector in those countries were almost twice larger than the import share. Employment share of agricultural sector in 2013 was sequentially presented for Thailand 36%, Indonesia 35%, Malaysia 13%, except for some countries for which data were unavailable. Import share of agricultural sector can also be anticipated using information presented in Table 3 on the percentage of agricultural land in respective countries. For example, in terms of import share of agricultural sector Brunei has the largest share by 15% followed by the Philippines 11%, while other member countries such as Indonesia, Malaysia, Myanmar, and Vietnam have

almost similar share around 8%. On the other hand, Myanmar apparently has the largest export share of agricultural sector by 30%, followed by Lao PDR 21%, Thailand 13.5%, Vietnam 12%, the Philippines 11%, and Malaysia 11%.

As it is expected, Singapore and Brunei apparently have the largest GDP per capita among member countries ranging from USD 40,000-55,000, leaving Cambodia, Myanmar, and Vietnam at their level of only USD 800-2,000, and Indonesia was slightly higher at USD 3,460. Most countries had

decreased GDP per capita in 2009, except Indonesia, Lao PDR, Vietnam, and Myanmar, but it recovered and increased again starting from 2010. Table 5 further indicates that only Singapore, Brunei, Malaysia, and Thailand are countries with higher GDP per capita above average in the region. This also implies that the demand for livestock products in these countries is expected to be far beyond the rest of the member countries. From the data presented in Table 3 and 4, it is obvious that Brunei with high GDP per capita also has high import share of agricultural sector. However,

Table 3. Land use in ASEAN member countries, 2012 (000 ha)

Country	Total area	Land area						
		Total land area	Agricultural area					Agric pop (000)
			Arable land	Permanent crops	Permanent pasture	Total agric (4+5+6)	% to land area	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Brunei	577	527	4	6	3	13	2.5	1
Cambodia	18,104	17,652	4,100	155	1,500	5,755	32.6	5,226
Indonesia	191,093	181,157	23,500	22,000	11,000	56,500	31.2	49,963
Lao PDR	23,680	23,080	1,450	169	850	2,469	10.7	2,586
Malaysia	33,080	32,855	965	6,500	285	7,750	23.6	1,513
Myanmar	67,659	65,329	10,820	1,465	308	12,593	19.3	20,726
Philippines	30,000	29,817	5,545	5,350	1,500	12,395	41.6	13,571
Singapore	72	70	1	0	n.a.	1	1.0	2
Thailand	51,312	51,089	16,650	4,500	800	21,860	42.8	18,032
Vietnam	33,095	31,007	6,400	3,800	642	10,842	35.0	30,566
ASEAN	448,672	432,583	69,344	43,945	16,888	130,178	30.1	142,186

n.a.: not available

Source: ASEAN (2014)

Table 4. GDP share, employment, export and import share of agricultural sector of ASEAN member countries, 2012-2013 (%)

Country	GDP Share		Employment Share		Export Share		Import Share	
	2012	2013	2012	2013	2012	2013	2012	2013
Brunei	1.3	1.3	n.a.	n.a.	0.05	0.16	11.95	15.17
Cambodia	25.0	n.a.	n.a.	n.a.	3.00	4.52	6.95	6.25
Indonesia	12.5	12.3	35.1	34.8	17.13	17.04	8.55	8.97
Lao PDR	26.9	n.a.	n.a.	n.a.	18.77	21.14	6.68	4.98
Malaysia	7.3	7.2	12.6	12.7	12.02	10.54	8.50	7.67
Myanmar	34.9	n.a.	n.a.	n.a.	35.35	29.60	8.53	8.54
Philippines	11.1	10.4	32.2	n.a.	9.27	10.92	10.94	10.82
Singapore	0.0	0.0	n.a.	n.a.	2.21	2.41	3.37	3.55
Thailand	8.4	8.3	38.9	36.2	14.02	13.50	5.23	5.27
Vietnam	15.8	17.6	48.4	n.a.	14.59	12.24	8.05	7.98

n.a.: not available

Source: ASEAN (2014)

Malaysia and Thailand with high GDP per capita have less import share meaning that these two countries have been able to manage their demands for livestock products domestically.

Jabbar (2015) reviewed the ASEAN Economic Community (AEC) blueprint which envisages that cooperation in food, agriculture and forestry is one of the seven key elements or approaches to create ASEAN as a single market and production base. Within agriculture, livestock sub-sector plays a key role in growth, employment, trade, food and nutrition security, poverty alleviation and gender equality. Share of agriculture in GDP usually declines with economic development but within agriculture share of livestock tends to increase due to changes in demand and dietary pattern towards protein rich foods. The same kind of changes is taking place in various degrees in ASEAN member states because of different levels of their development.

Furthermore, Faizaty (2014) underlined that GDP of an exporter country measures the production capacity of the country, while GDP of an importer country measures capacity to absorb by the country. In addition, country's national income in terms of GDP or per capita income, as well as the GDP sum of the trading partners also influence the trading between the countries. Other important factors include human population, exchange rate, distance as a proxy of transportation costs, import tariff, and trade cooperation. So far Singapore, Malaysia and Thailand have enjoyed the regional market under AEC, while Indonesia has not yet been as that beneficial compared to those countries. Consequently, Indonesia has to improve some of the livestock and poultry production

parameters to reduce production costs in order to achieve a better competition status.

The region has total agriculture land of 130 million hectares or about 31% of the total land available in the area and the region varies in its livestock and poultry population. Within the region, Indonesia evidently leads on the population of beef by 16.6 million heads, sheep 14.5 million heads, goats 18.6 million heads, and chickens 1,793 million heads. Vietnam and the Philippines lead in pigs population by 26.2 million heads and 11.8 million heads respectively, and these figures show similar pattern for meat production in the respective countries. Moreover, the population figures grew positively from 2010-2013 in all member countries with exemption for buffalo, chicken in Cambodia, and sheep-goats in all countries except in Indonesia, Lao and Myanmar. Beef cattle population was very minimal in both Brunei and Singapore, but moderately found in Malaysia, Lao PDR, the Philippines, and Cambodia. Indonesia, Thailand and Vietnam are member countries which were considered to have reasonably high beef cattle population. Finally, pig population was significantly shown by Vietnam, the Philippines, Indonesia and Thailand.

Note that Indonesia was the only country in the region which has significant sheep population compared to the rest of the member countries. Similarly, goats population was predominantly found in Indonesia, the Philippines and Vietnam. Indonesia is also leading in chicken population in the region, while Malaysia, Thailand, Vietnam, and the Philippines have almost similar number of chicken population (Table 6).

Table 5. GDP per capita at current prices, 2006-2013 (USD)

Country	2006	2007	2008	2009	2010	2011	2012	2013
Brunei	31,452	33,191	38,621	28,454	32,063	42,431	42,445	39,679
Cambodia	515	601	827	735	785	882	950	1,037
Indonesia	1,636	1,910	2,244	2,359	2,988	3,498	3,563	3,460
Lao PDR	576	719	882	913	1,079	1,262	1,443	1,548
Malaysia	6,160	7,166	8,393	7,216	8,515	9,962	10,346	10,420
Myanmar	233	333	436	538	706	853	885	888
Philippines	1,408	1,717	1,917	1,829	2,127	2,339	2,568	2,707
Singapore	33,580	39,224	39,724	38,577	46,570	52,865	54,007	55,182
Thailand	3,162	3,743	4,106	3,947	4,743	5,116	5,391	5,679
Vietnam	798	918	1,165	1,232	1,338	1,543	1,755	1,909
ASEAN	1,955	2,309	2,647	2,610	3,162	3,619	3,781	3,832

Source: ASEAN (2014)

Otte (2014) agreed that heterogeneity prevails in ASEAN member countries are rather diverse in many aspects and large disparities exist in population sizes, cultural backgrounds, structure and development of the economies, and levels of disposable income. Likewise, large differences exist in the structure of the livestock sectors of members and their respective levels of technology adoption. Livestock and poultry meat production in the region may also be a reflection of the level of technology adoption in each member country (Table 7).

It is interesting to know how these livestock and poultry sectors performed in each ASEAN member countries, and which species is performing better than the other within the country and between countries. Assessment of these sectors focused only on four groups of meat producing species, namely beef, pigs, sheep and goats, and broiler since these animals species are considered as major meat producer and showed their positive growth during the period of 2010-2013. Producer's price of live weight of each species measured by USD/ton was used as a measure, because it is a good proxy to measure the production cost, as one of elements of competition in producing livestock and poultry in the region. Therefore, the least the production cost of a livestock species among member countries, the more competitive status of the respective country.

Table 8 presents different production costs of live beef cattle in eight member countries. It indicates that in 2013 Cambodia was the most competitive country to produce per kg live beef cattle at USD 1.97, followed by the Philippines USD 2.06, Malaysia USD 3.27, and Indonesia USD 3.34. However, Indonesia at its rank 4th still has a good potency to produce competitive live beef cattle through its current national program to accelerate palm oil-beef cattle integration system. Technologies and innovations to implement the integrated oil palm-ruminants are already made available national wide as a way to achieve better production efficiency for both enterprises, the oil palm estate and the ruminant productions. Research and development in the integrated oil-palm and beef cattle system have been carried out in Indonesia particularly in the island of Sumatera and Kalimantan since 2003 where the fast majority of oil-palm plantation takes place, and shows very promising results in terms of reducing production cost and increasing beef cattle population (Sudaryanto 2017).

In addition to that, recently there has been effort to also integrate sheep with oil palm estate; hence, these ruminant productions are expected to be more efficient in the future. Feed technology to optimize the use oil palm leaves and fronds along with its factory by products as ruminants feed has also been introduced to

some oil palm enterprises with good prospect and promising results. The series of research done in this area has proved evidently that for each one hectare of oil palm plantation, there is biomass available as feeds for one mature cattle.

As far as beef cattle production is concerned, with current Indonesia's national program to accelerate beef production through oil-palm-beef cattle integrated system, the program will, in the near future, change the country's position in producing beef cattle which is currently at 4th rank within ASEAN member countries. According to DGEC (2015) data, given current 11 million hectares of oil-palm plantation area, with potential stocking rate of 1.5 to 2 heads of mature cattle per hectare (Mathius 2008; 2009), there is a potential for additional two million mature cattle population for this country. This will provide additional live cattle supply as mature-ready to slaughter cattle and, hence, will reduce the production cost of feeder stocks (Soedjana & Diwyanto 2014).

In relation to the good potential opportunity from the integrated system for oil palm and ruminants production, Indonesia has significant sheep population compared to the rest of the member countries, while goat population was predominantly found in Indonesia, the Philippines, and Vietnam. However, the most competitive country to produce live sheep and goats were not related to population as a measure. Moreover, Table 9 showed that in 2013 the Philippines can be considered as the most competitive country with cost of sheep and goat production per kg live weight of USD 2.52, followed by Vietnam USD 4.06, Indonesia USD 5.62, and Malaysia USD 6.67. However, Indonesia being a country with the highest population of sheep and goats in the region has not yet been able to produce sheep and goats competitively compared to other countries with lower population, such as the Philippines and Vietnam.

Although a reasonably high pig population showed by Vietnam, the Philippines, Indonesia and Thailand, Table 10 indicates that the production costs to produce per kg live pig in 2013 was competitively showed by Malaysia at USD 1.91, Vietnam USD 1.97 and Thailand USD 2.13. Only Vietnam and Thailand were the two countries which almost consistently in their performance on both population and production cost, while Indonesia and the Philippines were only in the order of rank 5th and 4th in the order of least production costs.

Similarly for chicken sector, Indonesia with the highest chicken population and only at rank 4th in the region, compared to Thailand, Malaysia, and the Philippines, has not yet performed well in terms of production costs. Thailand, however, as presented in Table 11 can be considered as the most competitive

Table 6. Livestock and poultry population, 2010-2013 (000 head)

Country	2010				2011				2012				2013			
	C+B	Pig	S+H	C+D	C+B	Pig	S+H	C+D	C+B	Pig	S+H	C+D	C+B	Pig	S+H	C+D
Brunei	5.0	1.3	10.6	15,130	5.0	1.3	11.0	15,225	5.1	1.3	11.2	15,728	3.2	1.2	11.0	19,230
Cambodia	4,187	2,057	-	24,948	4,109	2,000	-	25,000	3,595	2,120	-	22,647	3,576	2,150	-	21,300
Indonesia	15,587	7,477	27,345	1,393,932	16,129	7,758	28,885	1,476,552	17,413	7,831	30,626	1,597,121	18,081	8,246	33,136	1,843,953
Lao PDR	2,660	2,752	367.0	28,305	2,706	7,758	431.0	30,350	2,880	2,794	444.0	32,179	2,880	2,800	450.0	33,450
Malaysia	1,040	1,711	666.0	152,989	1,055	1,695	670.0	278,900	908.0	1,799	630.0	301,778	870.0	1,817	612.0	319,243
Myanmar	16,061	8,496	4,085	152,989	16,587	9,416	4,200	170,907	17,700	10,500	4,760	196,000	17,600	10,530	4,792	206,100
Philippines	5,841	13,398	4,208	169,252	5,593	12,303	3,912	172,939	5,457	11,863	3,745	174,203	5,410	11,843	3,724	173,521
Singapore	0.2	270	0.7	4,050	0.2	270.0	0.7	4,050	0.2	272.0	0.7	4,255	0.2	272	0.7	4,250
Thailand	8,121	7,624	423.0	261,151	8,378	7,660	480.0	267,179	6,935	7,500	504.0	281,202	6,435	7,924	462	283,242
Vietnam	8,685	27,373	1,288	286,864	8,149	27,056	1,268	322,600	7,817	26,494	1,344	308,461	7,706	26,261	1,345	314,756
ASEAN	62,187	71,159	38,383	2,595,451	62,706	71,124	39,816	2,748,477	62,709	71,173	42,057	2,933,574	62,580	71,843	44,523	3,209,815

C+B: Cattle and buffalo; S+H: Sheep and goat; C+D: Chicken and duck

Source: ASEAN (2014)**Table 7.** Livestock and poultry meat production by ASEAN countries, 2010-2013 (000 tons)

Country	2013				2012				2011				2010			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Brunei	0.8	0.0	0.1	26.9	0.8	0.1	0.1	19.7	0.8	0.1	0.1	19.4	0.8	0.1	0.1	18.8
Cambodia	73.2	98.5	n.a.	26.7	73.4	98.5	n.a.	28.0	72.9	97.5	n.a.	28.0	72.7	100.0	n.a.	28.2
Indonesia	585.9	742.5	112.7	1,872.5	540.8	728.8	115.1	1,781.0	503.3	721.1	121.2	1,642.8	472.4	695.0	113.7	1,565.6
Lao PDR	48.2	64.0	1.7	25.3	47.6	62.0	1.7	25.3	46.0	64.0	1.7	24.8	45.2	59.4	1.4	24.0
Malaysia	30.6	231.4	2.1	1,359.9	30.3	235.6	2.1	1,323.6	29.8	231.3	0.8	1,427.6	28.9	234.0	0.9	1,404.6
Philippines	296.9	1,681.1	54.7	1,079.1	296.9	1,677.5	53.1	979.4	302.9	1,649.3	50.9	807.7	299.2	1,613.5	52.1	773.0
Singapore	0.1	19.6	0.04	97.1	0.1	19.6	0.04	97.1	n.a.	19	n.a.	95.1	0	18.8	n.a.	94.5
Thailand	194.7	967.3	1.9	1,469.8	203.2	886.3	1.7	1,348.3	193.2	867.3	1.9	1,340.2	222.9	862	1.7	1,301
Vietnam	379.1	3,217.9	8.1	633	393.3	3,160	8.1	617.9	386.5	3,098.9	8.1	617	384.3	3,036.4	8.2	531.4

Livestock data for Myanmar were not available; n.a.: not available; A: Beef; B: Pig meat; C: Mutton & goat; D: Poultry meat

Source: ASEAN (2014)

Table 8. Production cost for live beef cattle in ASEAN member countries (USD/kg)

Year	Country (rank)							
	Brunei (8)	Cambodia (1)	Indonesia (4)	Lao PDR (7)	Malaysia (3)	Philippines (2)	Thailand (6)	Vietnam (5)
2006	n.a.	1.16	2.46	1.60	1.78	1.30	2.92	109
2007	7.10	1.31	2.73	2.12	2.04	1.44	2.79	1.26
2008	8.27	1.64	2.38	2.80	2.12	1.65	2.45	2.14
2009	8.17	1.57	2.71	3.36	2.12	1.62	2.35	2.26
2010	8.64	1.63	3.30	3.97	2.44	1.81	2.54	2.48
2011	9.75	1.90	3.52	4.59	2.68	1.93	3.02	2.72
2012	10.16	1.95	3.44	5.33	3.07	1.99	3.45	3.36
2013	10.47	1.97	3.34	5.20	3.27	2.06	4.25	3.80

Data for Myanmar and Singapore were not available; n.a.: not available

Source: FAOSTAT (2015), adapted from USD/ton to USD/kg

Table 9. Production cost for live sheep and goats in ASEAN member countries (USD/kg)

Year	Country (rank)				
	Brunei (5)	Indonesia (3)	Malaysia (4)	Philippines (1)	Vietnam (2)
2006	n.a.	5.45	3.47	1.36	1.95
2007	11.60	6.12	4.04	1.52	1.79
2008	12.95	6.52	4.55	1.70	2.21
2009	12.78	7.37	4.24	1.84	2.31
2010	13.53	9.37	5.06	2.07	2.42
2011	15.27	6.64	5.56	2.28	2.91
2012	15.91	6.54	5.75	2.41	3.50
2013	16.39	5.62	6.67	2.52	4.06

Data for five other member countries were not available; n.a.: not available

Source: FAOSTAT (2015), adapted from USD/ton to USD/kg

country to produce per kg live chicken at USD 1.41, followed by Malaysia USD 1.51, the Philippines USD 2.06, and Indonesia USD 3.30.

Table 12 summarizes performances of each member country in terms of human population along with their urban population and agricultural population, agricultural GDP share and ranks of their competitiveness on beef cattle, sheep and goats, broilers, and pigs in terms of production cost. Indonesia with the highest human population and also the highest population of beef cattle, sheep and goats, and chickens has not yet reached rank 1st nor 2nd for the production cost of the four livestock commodities. They are only at rank 4th for beef cattle, rank 3rd for sheep and goats, rank 4th for chickens, and rank 5th for pigs. The following member countries are at their first rank or

competitiveness status for the four livestock commodities, namely Cambodia for beef cattle, Malaysia for pigs, the Philippines for sheep and goats, and Thailand for broiler chickens (Figure 1).

Because animal husbandry in Indonesia is dominated by traditional and small scale, located mostly in rural areas, the policy option aimed at increasing production and productivity of livestock production should include the role and functions of livestock farming systems prevail in the rural areas (Soedjana 2011). However, most of small scale operations continue to face limits to intensification, although few have managed to upscale or specialize to a point where they can advance economically, and many depend partly on off-farm employment for their food security.

Table 10. Production cost for live pigs in ASEAN member countries (USD/kg)

Year	Country (rank)						
	Cambodia (7)	Indonesia (5)	Lao PDR (6)	Malaysia (1)	Philippines (4)	Thailand (3)	Vietnam (2)
2006	4.17	1.35	1.36	1.67	1.35	1.24	1.05
2007	4.50	1.41	1.65	1.38	1.55	1.11	1.18
2008	5.63	1.66	2.05	1.92	1.85	1.60	1.81
2009	5.38	1.73	2.35	1.96	1.79	1.66	1.67
2010	5.59	2.10	2.68	2.43	2.01	1.89	1.57
2011	6.51	2.78	3.01	2.48	2.06	2.15	2.25
2012	6.70	2.66	3.76	2.07	2.09	1.82	2.09
2013	6.77	2.43	2.96	1.91	2.26	2.13	1.97

Data for Brunei, Myanmar, and Singapore were not available

Source: FAOSTAT (2015), adapted from USD/ton to USD/kg

Table 11. Production cost for live bird broiler in ASEAN member countries (USD/kg)

Year	Country (rank)							
	Brunei (5)	Cambodia (7)	Indonesia (4)	Lao PDR (6)	Malaysia (2)	Philippines (3)	Thailand (1)	Vietnam (8)
2006	2.58	3.75	2.46	1.64	0.97	1.41	0.83	1.80
2007	2.76	4.32	2.61	1.99	1.09	1.75	0.98	2.93
2008	2.92	3.52	3.13	2.48	1.24	1.79	1.12	3.51
2009	2.88	3.24	3.69	2.84	1.15	1.88	1.11	3.77
2010	3.05	3.38	4.49	3.23	1.32	2.09	1.35	3.74
2011	3.44	3.76	4.03	3.63	1.55	2.19	1.54	4.19
2012	3.59	3.93	3.85	4.31	1.42	2.27	1.35	4.23
2013	3.70	3.97	3.30	3.96	1.51	2.06	1.41	4.52

Data for Myanmar and Singapore were not available

Source: FAOSTAT (2015), adapted from USD/ton to USD/kg

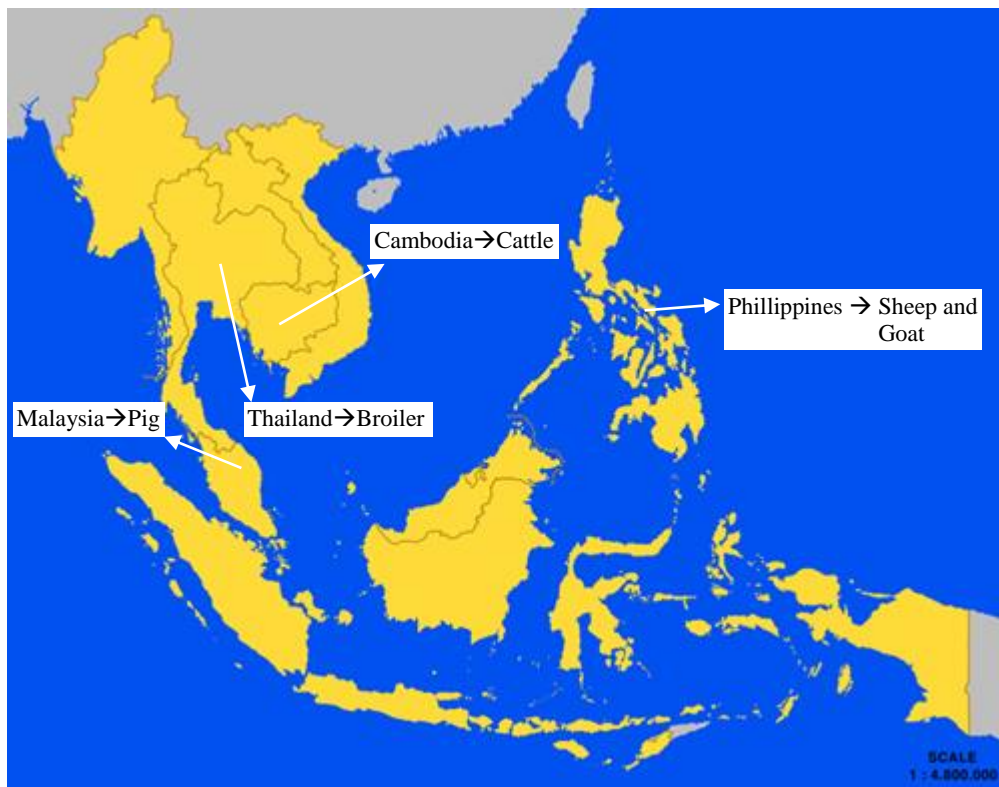
Moreover, beef is also known as high income elastic commodity prevails in Indonesia, with income elasticity of demand of 1.64% (Kustiari et al. 2010) meaning that for every 1% increase in income of the consumers the household will spend 1.64% of its income to purchase beef. This implies that the demand for beef will continue to increase as per capita income rises mostly from urban households, and the economy grows. However, domestic beef production has been managed by almost 97% by the smallholder farmers who keep only 1 to 3 cattle per household. They utilize traditional techniques, keep their animals as a live saving and market them anytime when cash are needed (Soedjana 2013a), and this potentially creates higher production cost per kilogram of live weight of beef cattle.

Soedjana (2013b) found out that diversified food consumption of animal origin in Indonesia has been naturally established. Livestock meat consumption diversification is based on many reasons including cultural, preferences or other economic status or income of the households. This phenomenon is also indicated by the magnitude of positive cross price elasticity between beef and mutton, beef and poultry meat, and between poultry meat and fish. Therefore, every effort to push higher consumption of one meat type will reduce the participation rate of others. Participation rates for beef and buffalo meats were found to be 26.15% (2002), 21.93% (2005), 16.18% (2008), 16.16% (2011), and 15.52% (2014). These data implied that increase demand for beef was mainly due

Table 12. Summary of important indices for ASEAN member countries

Country	Human population (000)	Urban population (%)	Agriculture population (000)	Agric. GDP share (%)	GDP per capita (USD)	Rank of competitiveness based on production cost (USD/ton)			
						Beef	Sheep & Goats	Broiler	Pigs
Brunei	406	78.0	1	1.3	39,679	8	5	5	n.a.
Cambodia	14,963	21.5	5,226	25.0	1,037	1	n.a.	7	7
Indonesia	248,818	52.0	49,963	12.3	3,460	4	3	4	5
Lao PDR	6,644	36.0	2,586	26.9	1,548	7	n.a.	6	6
Malaysia	29,948	73.0	1,513	7.2	10,420	3	4	2	1
Philippines	99,385	48.6	13,571	10.4	2,707	2	1	3	4
Singapore	5,399	100.0	2	0.0	55,182	n.a.	n.a.	n.a.	n.a.
Thailand	68,251	34.0	18,032	8.3	5,679	6	n.a.	1	3
Vietnam	89,709	32.2	30,566	17.6	1,909	5	2	8	2

Livestock data for Myanmar were not available; n.a.: not available

**Figure 1.** The highest rank of competitiveness of ASEAN countries based on production cost of livestock

to increased number of middle and upper income household within the population.

Table 12 indicates that the Philippines (sheep-goats, beef, pigs, and broilers), Malaysia (broilers, pigs, beef, and sheep-goats), Thailand (broilers and pigs), Vietnam (sheep-goats and pigs) and Indonesia (sheep-goats, beef, and broilers) have bright opportunities for improving the red and white meat production and productivities to achieve upper level of competitiveness in terms of low livestock and poultry production cost. These five member countries indicate their good level of competitiveness in terms of cost of producing live beef, sheep and goats, pigs, and broilers.

Since broiler and pig productions are mostly run by large corporation, it seems that competitive elements of these two subsectors have to do with the government policy and incentive systems, such as low interest, infrastructure, and other facilities for export promotion to improve the production system in order to compete with other poultry and pigs producing countries in the region, such as Thailand and Malaysia which are considered as countries with poultry meat and eggs self sufficiency ratio above 100% (Orissa International 2017).

STRATEGY TO IMPROVE INDONESIA COMPETITIVENESS

Livestock subsector in Indonesia, as in many other developing countries, plays a significant role particularly for rural livelihoods and the economy of the country. They are a crucial asset for the poor, and provide an important source of nutritive food for both rural and urban households. These socio-economic roles and others are increasing in their importance as the sector grows because of increasing human populations, incomes, and urbanization rates. In order to provide these benefits, the subsector uses a significant amount of land, biomass, and other resources. There is concern, however, on how to manage the sector's growth, so that these benefits can be attained at a lower environmental cost, despite the fact that manures from ruminant systems can be a valuable source of fertilizer for smallholder crops. Because of the high yield gaps in most of these production systems, increasing the efficiency of the livestock sector through sustainable intensification practices presents a real opportunity where research and development can contribute to provide more sustainable solutions.

Furthermore, referring to observation made by Delgado et al. (2001) which predicted that livestock revolution in developing countries, including ASEAN member countries of course, will continue until 2020 and will push the demand for livestock products which will make the developing countries stay as net

importers. In the case of Indonesia with the tendency of increased import volume, in both feeder stock and beef, in fact has reduced the bargaining position of domestic beef cattle industry. However, by accelerating the integrated system to produce red meat in Indonesia, it is expected that the domestic demand for beef and sheep-goats can be managed properly. Animal feed and feeding will, therefore, become more important in the future to support the growing livestock ruminant industry. Such information was underlined by Makkar (2012) that estimates of feed resources and demands are needed to assess the fractions of food grain that is used for feed. Although livestock feed shortages have clearly constrained productivity in many countries, the impacts of feed shortages at national level have been poorly characterized due to the lack of national scale feed assessments. In addition, information on the availability of feed ingredients at the country level will enhance the efficiency and profitability of the animal feed industry and assist researchers to formulate sustainable feeding strategies. Such information would also be useful for determining the input-output relations for countries.

In order to achieve this, it is necessary that production systems become market-oriented, better regulated, and socially acceptable so that the right mix of incentives exists for the systems to intensify. In addition to this, new diversification as well as integrated systems will also be essential when intensification is no longer the primary option for developing the livestock subsector. This paper indicated that in 2013 beef cattle production cost to produce per kilogram live weight of beef cattle as well as sheep and goats in Indonesia were only at rank 4th (beef) and rank 3rd (sheep and goats) compared to other member countries.

CONCLUSION

Indonesia was only at the fourth rank for beef, third for sheep and goat and fourth for broiler production cost to produce per kilogram live weight compared to other member ASEAN countries. Consequently, Singapore, Malaysia, and Thailand have enjoyed the regional market under ASEAN Economic Communities (AEC), while Indonesia has not yet as that beneficial compared to those countries.

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